

forms we have mentioned, which are dealt with in detail, frequent references are made to other examples in which equally good or further illustration of special features may be obtained. Similar thoroughness runs through the accounts of all the types.

Every one perusing the volume must be impressed with the high standard of its educational value. Teacher and student in this country are alike to be congratulated upon its publication. The former has now a thoroughly trustworthy laboratory guide to place in the hands of pupils, and the latter has a handbook in his own language to which he can refer with confidence in his search after a sound knowledge of plant-morphology.

This is only the first part of the work, and deals with Phanerogams and Pteridophytes. May the succeeding portion not be long in appearing! It is regrettable that the original intention of the authors "to preface the directions for the study of each type with a short account . . . of its salient morphological facts" has not been carried out in this part; Mr. Thiselton Dyer assigns in the preface the reason for its postponement. We are convinced that the want of such brief epitomes will be universally felt. But as the book is certain of a full measure of success, we look forward, with the authors, to the realisation of their hope that "the original scheme upon which the work was planned" may be "carried out in a future edition."

We conclude as we began by heartily welcoming the volume. We envy a student commencing to work with such a guide, and we are greatly mistaken if its effect is not very rapidly felt in the botanical teaching of the country.

#### THE PENNATULIDA OF THE NORWEGIAN NORTH ATLANTIC EXPEDITION

*Den Norske Nordhavss Expedition, 1876-1878. Zoologie  
Pennatulida. Ved D. C. Danielssen og Johan Koren.  
(Christiania : Grondahl and Sons, 1884.)*

THIS is the twelfth part of the series of monographs contained in this fine work, the first part of which was published in 1880. The former parts have dealt with, besides the chemistry and physics of the expedition, the fishes, a part of the Mollusca, the Gephyrea, Annelida, Asteroidea, and Holothuroidea, the monographs on the last four animal groups being by the same indefatigable naturalists who have produced the present memoir on the Pennatulida. The work is a highly creditable one to all concerned.

The present part is illustrated by twelve excellent plates, two of which are coloured, and which are in the same style as those already published by the same authors in their well-known memoir on new Alcyonians belonging to the Norwegian fauna published two years ago.<sup>1</sup> Thirteen species of Pennatulida belonging to eight genera were obtained during the expedition, and of these eleven species and two genera were new. One of the new genera is Svava, a small sea-pen with rudimentary fins and devoid of spicules on the sarcosome, cells and polyps. There is a stripe of zooids on either side of the stem, and in the two lateral canals of the stem are developed the zonads on the mesenteries of these zooids. The zooids alone produce gonads, the fully-developed

<sup>1</sup> "Bergens Museum. Nye Alcyonider, Gorgonider og Pennatulider tilhørende Norges Fauna." (Bergen, 1883.)

polyps being barren. They are viviparous, the larvae escaping from their mouths, as in *Corallium*. The other new genus, *Gunneria*, is founded on a fragment of a single specimen, but it is characterised by the presence of an immense quantity of spicules on the bodies of the polyps, their tentacles, and the sarcosoma, which latter forms a regular calcareous crust on the walls of the cells; the spicules are so closely packed in several layers that it is difficult to separate them, even with caustic potash. In this respect *Gunneria* approaches the *Gorgoniidae*; yet it is, nevertheless, a true Pennatulid.

The main feature of the memoir is, however, the part which relates to the now famous deep-sea Pennatulid, *Umbellula encrinus*, to which more than half the letter-press and seven of the five plates are devoted.

The Norwegian Expedition obtained twelve specimens of *Umbellula encrinus* from different localities. Kölle described eight species of the genus from the *Challenger* collection, but one of these, *U. magniflora*, is considered by the authors as referable to the old historical *U. encrinus*, as are also Lindahl's new species from the Swedish Expedition of 1871, viz. *U. miniacea* and *U. pallida*. The whole of the twelve specimens obtained by the Norwegian Expedition are here carefully described in all details. All of them differ from one another, displaying peculiarities in various ages and stages of development which might, were the series less complete, easily lead to the establishment of separate species. The largest specimen obtained was dredged from a depth of 763 metres. It is a giant indeed. The rachis and the polyps, of which there are forty in the bunch, are twice figured on the last two plates, of actual size, coloured and uncoloured. The bunch of polyps occupies with its breadth nearly the entire length of the folio plate. The plates are far the finest representation of *Umbellula* yet published. There are eight prominent lanceolate areas occupied by zooids which extend up between the lateral polyps on the calicle-like part of the rachis, and spread themselves inferiorly over the rachis generally. The zooids are described as having each a single protusable tentacle, the tentacle when not retracted looking like a pendent papilla. These tentacles sometimes, but not always, bear short lateral pinnules, which are hollow, their cavities communicating with those of the tentacles, and which can be retracted with them. Kölle, in his account of the *Challenger* Pennatulids, described similar zooids each bearing a single tentacle as existing in *Umbellula Huxleyi* and *U. Carpenteri*, and in the latter species found the single tentacles branched. He figures them, but only on a very small scale. On looking at the figures here given of these zooids (Tab. X., Figs. 56, 57) it is very difficult to understand their structure: the position of the mouth is not shown in any one, and they are drawn as elongate and flask-like in form when expanded, squat and rounded when retracted. The tentacle seems when protruded to be a direct narrow prolongation of the entire body of the zooid, and it appears as if on retraction this prolongation were telescoped into the basal region of the body. The base of the single tentacle should abut on one side of the mouth, but no such mouth-opening is figured. In the enlarged view of a zooid (Fig. 57) the mouth is neither definitely indicated nor referred to in the description. The text is not at all clear on the point.

The polyps bear the gonads, and are apparently viviparous. Very interesting conclusions are arrived at by the authors by comparison of the various stages at their disposal as to the mode of growth and successive additions of fresh polyps to the colony around the terminal primary polyp, and these are at variance with those of Lindahl. A couple of lateral polyps appear on each side of the terminal polyp, then another pair of laterals are formed, and the rachis expands in breadth. The centro-dorsal polyp is formed, and then the dorso-lateral are developed, whilst the lateral polyps become more numerous.

H. N. MOSELEY

#### OUR BOOK SHELF

*A Flora of the English Lake District.* By J. G. Baker, F.R.S., F.L.S. (London : George Bell and Sons, York Street, Covent Garden, 1885.)

IT is perhaps surprising that a "Flora" of the Lake district has not before been issued, considering the large number of botanists who have yearly rambled over its fells and dales. It has been left to Mr. J. G. Baker to do so, and with modesty he says "it does not seem likely at present to stand in the way of anything more complete." The limits of the "Flora" embrace parts of Cumberland, Westmoreland, and the whole of what is botanically called Lake Lancashire; but excludes "the northern half of Cumberland and the western slope of the Pennine Chain, through Cumberland and Westmoreland;" the exact boundaries are, however, not very clearly defined.

One cannot help feeling, directly the book is opened, that it is the work of one used to generalise and deal with facts in a broad way: in no part more so than in the first fourteen pages, where, accepting Mr. H. C. Watson's definitions, he describes the distributive types, zones of altitude, temperature, &c., with a clearness coming of long and practical acquaintance with the subject, giving comparative tables of the types, &c., with those of Northern Yorkshire, Northumberland and Durham, and Britain, and making the Lake Flora about 900 species. It should, however, be remembered that this number is based on Mr. H. C. Watson's estimate of 1425 species for Britain as a whole.

Had that estimate to be made now by Mr. Watson, the result would probably be the accepting of a larger number, not alone by the discovery of species since made, but by a decided feeling on his part "that there were some species that would eventually have to be divided." It may well be asked *why* is there this comparatively large amount of difference demanded among our native plants to constitute a "species" and the little often accepted among newly-discovered "species" from distant countries; doubtless knowledge is progressive in the latter case, but still theories and generalisations are built up on them with as much apparent certainty as on floras long known and studied. Mr. Baker then enumerates the species constituting the flora, running up to 234 pages, numbering them according to the sixth edition of the "London Catalogue," showing also (but not numbering) the large number of doubtful plants that have at various times been reported from the district.

Perhaps the most striking fact brought out by this "Flora" is the scarcity of aquatic species compared with the numerous lakes and tarns, of which there must be between sixty and seventy, large and small. Whether in this particular district this is from the want of investigation, or from a real paucity of species or specimens, is difficult to say; but certainly our lakes and waters have not been sufficiently systematically searched, whether from the botanical, zoological, or chemical point of view. In this we should do well to emulate the Swedish naturalists; but in our

case it may well be asked, "Where are we to look for help?"

How little we know of the life-histories of our aquatic plants! and it may well be suggested as a study for those botanists, who, while not being able to take up botany in the way so ably advocated lately by Prof. Bower in NATURE, still have some leisure from other occupations and duties, and could really advance the knowledge of our flora beyond mere collecting. It is only necessary to turn over the plates of Dr. T. Irmisch's work on them to understand what is meant and required.

AR. B.

*The Fallacy of the Present Theory of Sound.* By Henry A. Mott, jun., Ph.D., E.M., &c., Professor of Chemistry and Physics in the New York Medical College and Hospital for Women; Author of "The Chemist's Manual," "Was Man Created?" "Adulteration of Milk," "Testing the Value of Rifles by Firing under Water," "The Laws of Nature," "The Air We Breathe and Ventilations," &c. 12mo. (New York: Printed for the Author, 1885.)

THIS is a very curious book. Its author appends to his name recognised scientific titles, and seems to hold a responsible position as a teacher; but he has been led into a hopeless and inextricable muddle about wave-motion; and, starting with a misconception, he naturally obtains results so utterly at variance with common sense and experience, that it is remarkable he cannot see his error.

He begins by admitting that "to attack a theory which has been upheld for 2500 years, and which has been and is sustained by the greatest living scientists, is certainly a very bold undertaking." But he feels bound, nevertheless, "to come to the front and join Dr. A. Wilford Hall in exposing the fallacy." He fulminates, moreover, the following withering defiance at false prophets: "If Profs. Helmholtz, Tyndall, Lord Rayleigh, Sir William Thomson in Europe, and Profs. Rood and Mayer in this country, wish to retain the respect and confidence of thinking people, they will at once endeavour either to defend the theory of sound, or, like men, come boldly to the front and acknowledge that it is fallacious."

There can be no doubt that these various noblemen and gentlemen will at once proceed to adopt humbly the latter and safer alternative; because it is obvious that if they do not do so speedily, creation and nature will come to a premature end. This rather serious occurrence is thus predicted: "The lowest tone of an organ is stated by Prof. Blaserna to have sixteen vibrations to the second, and a consequent wave-length of 70 feet. It thus follows, says Dr. Hall, that in the sound of such an organ-pipe the air-particles (as a whole) are obliged to travel 35 feet and back sixteen times each second in order to pass from the space occupied by the centre of rarefaction to the centre of condensation and back. They would thus move with a velocity in one direction of 560 feet a second, or at the rate of 381 miles an hour, which would produce a tornado of more than double the velocity necessary to sweep a village into ruins. If there was the least truth in the wave-theory, the sound of a church-organ should get up a cyclone which would blow a cathedral into atoms."

This is truly very horrible! far worse than dynamite. Saddened by these reflections, we can bear with comparative equanimity the revelation that "the prong of a tuning-fork moves at the rate of only about one inch in four years," and "instead of swiftly advancing, as Tyndall says, sounds audibly when moving more than 25,000 times slower than the hour hand of a family clock, and more than 300,000,000 times slower than any clock-pendulum ever constructed, instead of very much faster, as Helmholtz teaches."

One more quotation is irresistible: "Imagine," says our author, who seems to have recovered wonderfully from the terrestrial cataclysm which he and the evil-doers